

COSMOGENIC ^7Be DEPOSITION OBSERVED IN FINNISH LAPLAND DURING 1991-2014

A. -P. Leppänen¹

¹Environmental Surveillance and Measurement, Radiation and Nuclear Safety Authority - STUK, Rovaniemi, 96400, Finland email: ari.leppanen@stuk.fi

The ^7Be isotope is produced in the nuclear reaction between galactic cosmic radiation and atmospheric atoms [1]. ^7Be isotopes are regularly observed in atmospheric aerosols and in deposition. STUK has three sampling stations in Finnish Lapland located at Rovaniemi, Sodankylä and Ivalo. The fallout samples are collected with passive RITVA collectors. They collect total deposition which include dry and wet deposition. Deposition collection period is one month but samples from 3 consecutive months are combined for measurement. The samples are measured with gamma spectrometry. The production is dependent on the flux of the galactic cosmic rays. After production ^7Be isotope become attached to atmospheric aerosols after which they follow the fate of the aerosols. In deposition samples, ~90% of the deposition is caused by wet deposition [2]. The observed ^7Be deposition shows a clear annual variation where high deposition values are observed during summer and low deposition values during winter. The ^7Be deposition is strongly influenced by the local weather and climate conditions. There is also an interannual variation pattern which should follow the intensity variation of galactic cosmic rays. However, noise caused by the climate on cosmogenic ^{10}Be time-series masks the production variation in time scales less than ~100 years [3]. This is also observed in ^7Be time-series within this study where time series cover only two solar cycles. Hence, the observed interannual variations is mainly caused by climate variations where the solar variation signal is damped.

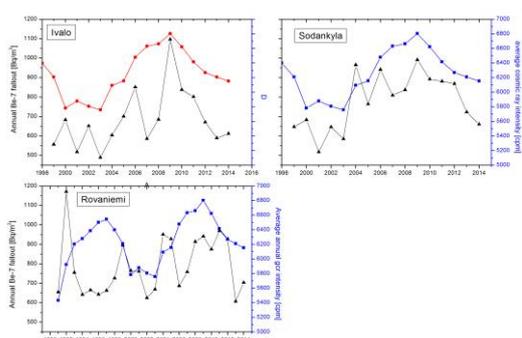


Figure 1. Annual ^7Be deposition vs. galactic cosmic ray intensity

[1] Beer, J. McCracken K., von Steiger, R. (2012)., *Cosmogenic radionuclides*, Springer-Verlag, Berlin

[2] Outola, I., Saxén, R. (2012). *Radionuclide deposition in Finland during 1961-2006*. In: STUK-A253., Helsinki Finland.

[3] Usoskin et al., (2009). On the common solar signal in different cosmogenic isotope data sets. *Sol. and Helios. Phys.*, 114 (A3).